Because this proposed national advisory body would have a substantial group of public and community representatives, as well as scientific and physician leaders, the advisory committee itself could provide one form of community review and input with regard to the conduct of the study. This input, although remote from the specific community in which the research is to be conducted, would nonetheless provide a unique form of community information and response not available with only local information.

Finally, this national advisory body could provide advice on the methods used by the investigators to inform the local community and to provide the means for receiving community input. The body could also provide reasonable advice on how the local IRB and investigators should respond to objections or concerns expressed by the community or individuals within the community. The specific details of information provided to the community, a detailed listing of expressions of concern or support by the community and the reasonableness of the response would be disclosed to the advisory committee. A very difficult problem would be the serious objection to the conduct of the study by a very small group of individuals within a broader, well-informed community wishing to participate. A national advisory body could provide standards and reasonableness with regard to denying the objections made by a small number of individuals within a large community. A mandatory national advisory group review was not recommended, because it was viewed that this additional step would become another major delay in the conduct of straightforward research under a waiver.

CONCLUSIONS

1. The treatment of cardiac arrest is in desperate need of clinical research on how to improve survival and decrease disability outcomes.
2. The results of enormous efforts to salvage patients from cardiac arrest have been extremely disappointing. These patients are not likely to improve, unless there are fundamental and applied research efforts to produce major advances.
3. A critically important target for resuscitation research is avoidance of severe neurologic disability.
4. Patients in cardiac arrest are unable to provide informed consent. Their disease has deprived them of autonomy. Thus, a strong and thoughtful IRB is critical in assessing the need for and, ultimately, where appropriate, in granting a waiver of informed consent. Advance directives should always be honored.
5. As used in the FDA's regulations on waiver of informed consent, "prospect of direct benefit to the subject" should be taken to mean: 1) the therapy is directed to the patient's condition that required the waiver; 2) there is at least as good a chance of a beneficial result as a deleterious outcome from the intervention; 3) in randomized trials, there is clinical equipoise; and 4) in nonrandomized trials, the risks and benefits profile of the experimental treatment is at least as favorable as the current standard of care.
6. There is a need for a major educational effort to inform the public and the mass media of these issues, focusing on the importance of waivers of informed consent.
7. The IRBs and investigators should be provided with additional education and support toward implementation of the regulations on waiver of informed consent. The ACC, American Heart Association (AHA), Society for Academic Emergency Medicine (SAEM), American College of Emergency Physicians (ACEP), American Academy of Neurology (AAN), American Society of Anesthesiology (ASA), National Association of Emergency Medical Services Physicians (NAEMSP) and other professional societies should have a leadership role.

The final rule advanced by the FDA in 1996 provides researchers with an opportunity to do resuscitation studies in circumstances in which individual patients are unable to provide prospective informed consent. The final rule clearly states the criteria for applying the waiver of informed consent, but gives limited guidance for its implementation. The number of resuscitation studies for which waiver of informed consent apply is limited, and IRBs and principal investigators may not be familiar or have experience with the regulations providing for waiver of informed consent. A substantial number of questions concerning its implementation have arisen. In addition, to date, there has been limited experience with the new regulations, and no prototype for its implementation exists. Although the FDA promises a guidance statement giving suggestions for implementing the regulations, this statement is still in the process of final approval. Even after it is approved, it is likely that IRBs and investigators will need education and support to implement the regulations. Therefore, we believe that professional organizations such as the ACC, AHA, SAEM, ACEP, AAN, ASA and NAEMSP should develop strategies to educate and support researchers and IRBs in implementing the regulations regarding waiver of informed consent. One strategy might be for each organization to identify experts within its own membership who are familiar with the regulations, understand their purpose and spirit and have some knowledge of existing methods of implementing them. In addition, these organizations should advertise the availability of consultants within the organization who can assist investigators in determining the best methods of implementing the regulations on a protocol-by-protocol basis. These organizations should also make the availability of this expertise known beyond their membership, so that investigators with no official means of receiving such counsel might have the ability to discuss projects and implementation strategies with knowledgeable individuals representing the resuscitation research community as a whole. Organizations should develop didactic pro-

grams regarding implementing the waiver for presentation at national meetings and have literature available for researchers. The support and education regarding implementation of the regulations given by these various professional organizations may require some financial assistance of the organizations. This commitment is an important mission of these professional organizations, whose members include resuscitation researchers committed to advancing the emergency care of their patients and society.

The ACC should, as a consequence of this 31st Bethesda Conference, be positioned to rapidly provide input to the anticipated FDA-drafted guidance document on implementation of the regulation on waiver of informed consent.

The 1996 FDA regulations provide for waiver of informed consent in life-threatening emergencies. Unfortunately, there is a widespread misunderstanding among sponsors, clinical investigators and IRBs of some of the provisions of the regulations, particularly with respect to the degree to which participation in the study must provide a positive benefit to each individual subject and in the areas of community consultation and public notification. A draft guidance document that addresses all aspects of the informed consent waiver process is in final preparation at FDA. The ACC should actively participate in public comment on the draft guidelines.

8. An official advisory group should serve as an optional resource to local IRBs, the FDA, sponsors and individual or groups of investigators, and may be called on for advice by any of these sources. This group should be constituted under the auspices of a concerned federal government body.

Many IRBs are reported to be unfamiliar with or uncertain as to how to practicably apply the waiver of informed consent regulation. In addition, FDA staff, sponsors or groups of investigators may have internal disagreements on how to discharge their responsibilities with regard to a proposed investigation. The conferees believe that for these groups, and where a protocol will involve multiple centers and hence multiple IRBs, it would be valuable to have an authoritative independent national forum. This optional forum would provide broadly applicable evaluation and advice on how to meet the requirements of the waiver regulation before consideration of a given protocol on an institution-by-institution basis. Therefore, the conferees recommend that the federal government make available an advisory committee to provide review, on a request basis, of clinical investigations that plan to use the waiver of informed consent provisions. This committee, modeled after RAC, might be either an independent advisory committee for these specific issues or a panel constituted under the charter of an existing committee with appropriate jurisdiction (e.g., an FDA advisory committee supplemented with patient or public representatives and specialists in bioethics and communication). The advisory committee should, in conjunction with its secretariat, have the discretion to accept for review and discussion those topics which give rise to significant new issues and decline any issues believed to be settled by previous similar experience or better handled at the local IRB level. The scope of the advice offered should include the full range of likely controversial topics raised by the waiver regulations or available guidance on implementation of them. This would include the ethics of informed consent waiver in a given protocol, the scientific support for the proposed study, whether there is clinical equipoise regarding the treatments, trial design issues, the appropriateness and adequacy of the proposed mechanism for public input and informing the public of the trial.

REFERENCES

1. American College of Cardiology. 13th Bethesda Conference: Emergency Cardiac Care. J Am Coll Cardiol 1982;50:365–420.
2. Brenner B, Stark B, Kauffman J. The reluctance of house staff to perform mouth-to-mouth resuscitation in the inpatient setting: what are the considerations? Resuscitation 1994;28:185–93.
3. Brenner B, Kauffman J, Sachter JJ. Comparison of the reluctance of house staff of metropolitan and suburban hospitals to perform mouth-to-mouth resuscitation. Resuscitation 1996;32:5–12.
4. Ornato JP, Hallagan LF, McMahan SB, Peeples EH, Rostafinski AG. Attitudes of BCLS instructors about mouth-to-mouth resuscitation during the AIDS epidemic. Ann Emerg Med 1990;19:151–6.
5. Ornato JP. Should bystanders perform mouth-to-mouth ventilation during resuscitation? Chest 1994;106:1641–2.
6. Otto CW. Airway management and ventilation during CPR. Acta Anaesthesiol Scand Suppl 1997;111:52–4.
7. Van Hoeyweghen RJ, Bossaert LL, Mullie A, et al, for the Belgian Cerebral Resuscitation Study Group. Quality and efficiency of bystander CPR. Resuscitation 1993;26:47–52.
8. American Heart Association. 1998 Heart and Stroke Statistical Update. Dallas, 1997.
9. Hossack K, Hartwig R. Cardiac arrest associated with supervised cardiac rehabilitation. J Cardiac Rehab 1982;2:402–8.
10. Nichol G, Stiell IG, Laupacis A, Pham B, De Maio VJ, Wells GA. A cumulative meta-analysis of the effectiveness of defibrillator-capable emergency medical services for victims of out-of-hospital cardiac arrest. Ann Emerg Med 1999;34:517–25.
11. Kuilman M, Bleeker JK, Hartman JA, Simoons ML. Long-term survival after out-of-hospital cardiac arrest: an 8-year follow-up. Resuscitation 1999;41:25–31.
12. Lui JC. Evaluation of the use of automatic external defibrillation in out-of-hospital cardiac arrest in Hong Kong. Resuscitation 1999;41: 113–9.
13. Herlitz J, Bahr J, Fischer M, Kuisma M, Lexow K, Thorgeirsson G. Resuscitation in Europe: a tale of five European regions. Resuscitation 1999;41:121–31.
14. Braslow A, Brennan RT, Newman MM, Bircher NG, Batcheller AM, Kaye W. CPR training without an instructor: development and evaluation of a video self-instructional system for effective performance of cardiopulmonary resuscitation. Resuscitation 1997;34:207–20.
15. Morgan CL, Donnelly PD, Lester CA, Assar DH. Effectiveness of the BBC's 999 training roadshows on cardiopulmonary resuscitation: video performance of cohort of unforewarned participants at home six months afterwards. BMJ 1996;313:912–6.
16. Donnelly PD, Lester CA, Morgan CL, Assar D. Evaluating CPR performance in basic life support: the VIDRAP protocol. Resuscitation 1998;36:51–7.
17. Kaye W, Mancini ME. Retention of cardiopulmonary resuscitation

skills by physicians, registered nurses, and the general public. Crit Care Med 1986;14:620–2.
18. Kaye W, Rallis SF, Mancini ME, et al. The problem of poor retention of cardiopulmonary resuscitation skills may lie with the instructor, not the learner or the curriculum. Resuscitation 1991;21: 67–87.
19. Assar D, Chamberlain D, Colquhoun M, et al. Randomized controlled trials of staged teaching for basic life support. Resuscitation 2000. In press.
20. Ochoa FJ, Ramalle-Gomara E, Carpintero JM, Garcia A, Saralegui I. Competence of health professionals to check the carotid pulse. Resuscitation 1998;37:173–5.
21. Berg RA, Kern KB, Sanders AB, Otto CW, Hilwig RW, Ewy GA. Bystander cardiopulmonary resuscitation: is ventilation necessary? Circulation 1993;88:1907–15.
22. Berg RA, Wilcoxson D, Hilwig RW, et al. The need for ventilatory support during bystander CPR. Ann Emerg Med 1995;26:342–50.
23. Berg RA, Kern KB, Hilwig RW, et al. Assisted ventilation does not improve outcome in a porcine model of single-rescuer bystander cardiopulmonary resuscitation. Circulation 1997;95:1635–41.
24. Kern KB, Hilwig RW, Berg RA, Ewy GA. Efficacy of chest compression-only BLS CPR in the presence of an occluded airway. Resuscitation 1998;39:179–88.
25. Noc M, Weil MH, Tang W, Turner T, Fukui M. Mechanical ventilation may not be essential for initial cardiopulmonary resuscitation. Chest 1995;108:821–7.
26. Bossaert L, Van Hoeyweghen R, for the Cerebral Resuscitation Study Group. Evaluation of cardiopulmonary resuscitation (CPR) techniques. Resuscitation 1989;17 Suppl:S99–109 (Discussion S199–206).
27. Berg RA, Hilwig RW, Kern KB, Babar I, Ewy GA. Simulated mouth-to-mouth ventilation and chest compressions ("bystander" CPR) improves outcome in a swine model of prehospital pediatric asphyxial cardiac arrest. Crit Care Med 1999;27:1893–9.
28. White RD, Hankins DG, Bugliosi TF. Seven years' experience with early defibrillation by police and paramedics in an emergency medical services system. Resuscitation 1998;39:145–51.
29. Niemann JT, Cairns CB, Sharma J, Lewis RJ. Treatment of prolonged ventricular fibrillation: immediate countershock versus high-dose epinephrine and CPR preceding countershock. Circulation 1992;85:281–7.
30. Cobb LA, Fahrenbruch CE, Walsh TR, et al. Influence of cardiopulmonary resuscitation prior to defibrillation in patients with out-of-hospital ventricular fibrillation. JAMA 1999;281:1182–8.
31. Auble TE, Menegazzi JJ, Paris PM. Effect of out-of-hospital defibrillation by basic life support providers on cardiac arrest mortality: a meta-analysis. Ann Emerg Med 1995;25:642–8.
32. Kellermann AL, Hackman BB, Somes G, Kreth TK, Nail L, Dobyns P. Impact of first-responder defibrillation in an urban emergency medical services system. JAMA 1993;270:1708–13.
33. Shuster M, Keller JL. Effect of fire department first-responder automated defibrillation. Ann Emerg Med 1993;22:721–7.
34. Davis EA, Mosesso VNJ. Performance of police first responders in utilizing automated external defibrillation on victims of sudden cardiac arrest. Prehosp Emerg Care 1998;2:101–7.
35. Groh WL, Newman MMMRB, Zipes DP. Six-minute call-to-shock time achieved in police defibrillation trial (abstr). Circulation 1998;98 Suppl I:I-174.
36. Mosesso VNJ, Davis EA, Auble TE, Paris PM, Yealy DM. Use of automated external defibrillators by police officers for treatment of out-of-hospital cardiac arrest. Ann Emerg Med 1998;32:200–7.
37. White RD, Vukov LF, Bugliosi TF. Early defibrillation by police: initial experience with measurement of critical time intervals and patient outcome. Ann Emerg Med 1994;23:1009–13.
38. White RD, Asplin BR, Bugliosi TF, Hankins DG. High discharge survival rate after out-of-hospital ventricular fibrillation with rapid defibrillation by police and paramedics. Ann Emerg Med 1996;28: 480–5.
39. White RD. Early out-of-hospital experience with an impedance-compensating low-energy biphasic waveform automatic external defibrillator. J Interv Card Electrophysiol 1997;1:203–8.
40. O'Rourke MF, Donaldson E, Geddes JS. An airline cardiac arrest program. Circulation 1997;96:2849–53.
41. Page RL, Hamdan MH, McKenas DK. Defibrillation aboard a commercial aircraft. Circulation 1998;97:1429–30.
42. Page RL, Joglar J, Hamdan MH, et al. Initial experience with on-board automatic external defibrillators on a domestic commercial airline (abstr). Circulation 1998;98 Suppl I:I-173.
43. Valenzuela TD, Bjerke HS, Clark LL, Hardman R, Spaite DW, Nichol G. Rapid defibrillation by nontraditional responders: the Casino Project. Acad Emerg Med 1998;5:414–5.
44. Karch SB, Graff J, Young S, Ho CH. Response times and outcomes for cardiac arrests in Las Vegas casinos. Am J Emerg Med 1998;16: 249–53.
45. Cummins RO, Chapman PJ, Chamberlain DA, Schubach JA, Litwin PE. In-flight deaths during commercial air travel: how big is the problem? JAMA 1988;259:1983–8.
46. Accuracy of an automated external defibrillator during field use for out-of-hospital cardiac arrest. Public Access Defibrillation II: Strengthening the Chain of Survival Conference, Washington, DC, April 17, 1997.
47. Weaver WD, Sutherland K, Wirkus MJ, Bachman R. Emergency medical care requirements for large public assemblies and a new strategy for managing cardiac arrest in this setting. Ann Emerg Med 1989;18:155–60.
48. Peberdy M, Ornato J, Frank R, Schmeil CJ, Heffner A, Kamilakis P. Physician office preparedness for medical emergencies: is your doctor's office prepared to treat a cardiac arrest? (abstr). Circulation 1997;96 Suppl I:I-561.
49. Cummins RO, Ornato JP, Thies WH, Pepe PE. Improving survival from sudden cardiac arrest: the "chain of survival" concept. A statement for health professionals from the Advanced Cardiac Life Support Subcommittee and the Emergency Cardiac Care Committee, American Heart Association. Circulation 1991;83:1832–47.
50. Babbs CF, Yim GK, Whistler SJ, Tacker WA, Geddes LA. Elevation of ventricular defibrillation threshold in dogs by antiarrhythmic drugs. Am Heart J 1979;98:345–50.
51. Dorian P, Fain ES, Davy JM, Winkle RA. Lidocaine causes a reversible, concentration-dependent increase in defibrillation energy requirements. J Am Coll Cardiol 1986;8:327–32.
52. Echt DS, Black JN, Barbey JT, Coxe DR, Cato E. Evaluation of antiarrhythmic drugs on defibrillation energy requirements in dogs: sodium channel block and action potential prolongation. Circulation 1989;79:1106–17.
53. Kerber RE, Pandian NG, Jensen SR, et al. Effect of lidocaine and bretylium on energy requirements for transthoracic defibrillation: experimental studies. J Am Coll Cardiol 1986;7:397–405.
54. Tacker WAJ, Niebauer MJ, Babbs CF, et al. The effect of newer antiarrhythmic drugs on defibrillation threshold. Crit Care Med 1980;8:177–80.
55. Zhou L, Chen BP, Kluger J, Fan C, Chow MS. Effects of amiodarone and its active metabolite desethylamiodarone on the ventricular defibrillation threshold. J Am Coll Cardiol 1998;31: 1672–8.
56. Harrison EE. Lidocaine in prehospital countershock refractory ventricular fibrillation. Ann Emerg Med 1981;10:420–3.
57. van Walraven C, Stiell IG, Wells GA, Hebert PC, Vandemheen K, for the The OTAC Study Group. Do advanced cardiac life support drugs increase resuscitation rates from in-hospital cardiac arrest? Ann Emerg Med 1998;32:544–53.
58. Herlitz J, Ekstrom L, Wennerblom B, et al. Lidocaine in out-of-hospital ventricular fibrillation: does it improve survival? Resuscitation 1997;33:199–205.
59. Weaver WD, Fahrenbruch CE, Johnson DD, Hallstrom AP, Cobb LA, Copass MK. Effect of epinephrine and lidocaine therapy on outcome after cardiac arrest due to ventricular fibrillation. Circulation 1990;82:2027–34.
60. Thel MC, Armstrong AL, McNulty SE, Califf RM, O'Connor CM, for the Duke Internal Medicine Housestaff. Randomised trial of magnesium in in-hospital cardiac arrest. Lancet 1997;350:1272–6.
61. Fatovich DM, Prentice DA, Dobb GJ. Magnesium in cardiac arrest (the magic trial). Resuscitation 1997;35:237–41.
62. Haynes RE, Chinn TL, Copass MK, Cobb LA. Comparison of bretylium tosylate and lidocaine in management of out-of-hospital ventricular fibrillation: a randomized clinical trial. Am J Cardiol 1981;48:353–6.
63. Anastasiou-Nana MI, Nanas JN, Nanas SN, et al. Effects of

amiodarone on refractory ventricular fibrillation in acute myocardial infarction: experimental study. J Am Coll Cardiol 1994;23:253–8.
64. Kudenchuk PJ, Cobb LA, Copass MK, et al. Amiodarone for resuscitation after out-of-hospital cardiac arrest due to ventricular fibrillation. N Engl J Med 1999;341:871–8.
65. Weaver WD, Cobb LA, Copass MK, Hallstrom AP. Ventricular defibrillation—a comparative trial using 175-J and 320-J shocks. N Engl J Med 1982;307:1101–6.
66. Poole JE, White RD, Kanz KG, et al., for the LIFE Investigators. Low-energy impedance-compensating biphasic waveforms terminate ventricular fibrillation at high rates in victims of out-of-hospital cardiac arrest. J Cardiovasc Electrophysiol 1997;8:1373–85.
67. Gliner BE, Jorgenson DB, Poole JE, et al., for the LIFE Investigators. Treatment of out-of-hospital cardiac arrest with a low-energy impedance-compensating biphasic waveform automatic external defibrillator. Biomed Instrum Technol 1998;32:631–44.
68. Schneider T, Martens P, Paschen H-R, et al. Defibrillation efficacy decreases with duration of cardiac arrest for 200-J monophasic but not biphasic shocks (abstr). Circulation 1999;100 Suppl I:1–90.
69. Gold MR, Gold MR, editors. Cost-effectiveness in Health and Medicine. New York: Oxford University Press, 1996.
70. Garber AM, Phelps CE. Economic foundations of cost-effectiveness analysis. J Health Econ 1997;16:1–31.
71. Nichol G, Laupacis A, Stiell IG, et al. Cost-effectiveness analysis of potential improvements to emergency medical services for victims of out-of-hospital cardiac arrest. Ann Emerg Med 1996;27:711–20.
72. Nichol G, Hallstrom AP, Ornato JP, et al. Potential cost-effectiveness of public access defibrillation in the United States. Circulation 1998;97:1315–20.
73. Nichol G, Valenzuela T, Wells G, et al. Potential cost-effectiveness of early defibrillation by nontraditional responders for treatment of out-of-hospital sudden cardiac arrest (abstr). Circulation 1999;100 Suppl I:I-868.
74. Valenzuela TD, Criss EA, Spaite D, Meislin HW, Wright AL, Clark L. Cost-effectiveness analysis of paramedic emergency medical services in the treatment of prehospital cardiopulmonary arrest. Ann Emerg Med 1990;19:1407–11.
75. Domanovits H, Meron G, Sterz F, et al. Successful automatic external defibrillator operation by people trained only in basic life support in a simulated cardiac arrest situation. Resuscitation 1998; 39:47–50.
76. Eisenberg MS, Copass MK, Hallstrom AP, et al. Treatment of out-of-hospital cardiac arrests with rapid defibrillation by emergency medical technicians. N Engl J Med 1980;302:1379–83.
77. Haynes BE, Mendoza A, McNeil M, Schroeder J, Smiley DR. A statewide early defibrillation initiative including laypersons and outcome reporting. JAMA 1991;266:545–7.
78. Ho J, Held T, Heegaard W, Crimmins T. Automatic external defibrillation and its effects on neurologic outcome in cardiac arrest patients in an urban, two-tiered EMS system. Prehosp Disaster Med 1997;12:284–7.
79. Mols P, Beaucarne E, Bruyninx J, et al. Early defibrillation by EMTs: the Brussels experience. Resuscitation 1994;27:129–36.
80. Nichol G, Detsky AS, Stiell IG, O'Rourke K, Wells G, Laupacis A. Effectiveness of emergency medical services for victims of out-of-hospital cardiac arrest: a meta-analysis. Ann Emerg Med 1996;27: 700–10.
81. Schrading WA, Stein S, Eitel DR, et al. An evaluation of automated defibrillation and manual defibrillation by emergency medical technicians in a rural setting. Am J Emerg Med 1993;11:125–30.
82. Sweeney TA, Runge JW, Gibbs MA, et al. EMT defibrillation does not increase survival from sudden cardiac death in a two-tiered urban–suburban EMS system. Ann Emerg Med 1998;31:234–40.
83. Guidelines for advanced life support. A statement by the Advanced Life Support Working Party of the European Resuscitation Council, 1992. Resuscitation 1992;24:111–21.
84. Emergency Cardiac Care Committee and Subcommittees, American Heart Association. Guidelines for cardiopulmonary resuscitation and emergency cardiac care. Part I. Introduction. JAMA 1992;268:2171–83.
85. Brillman J, Sanders A, Otto CW, Fahmy H, Bragg S, Ewy GA. Comparison of epinephrine and phenylephrine for resuscitation and neurologic outcome of cardiac arrest in dogs. Ann Emerg Med 1987;16:11–7.
86. Prengel AW, Lindner KH, Keller A. Cerebral oxygenation during cardiopulmonary resuscitation with epinephrine and vasopressin in pigs. Stroke 1996;27:1241–8.
87. Strohmenger HU, Lindner KH, Prengel AW, Pfenninger EG, Bothner U, Lurie KG. Effects of epinephrine and vasopressin on median fibrillation frequency and defibrillation success in a porcine model of cardiopulmonary resuscitation. Resuscitation 1996;31:65–73.
88. Strohmenger HU, Lindner KH, Keller A, Lindner IM, Pfenninger E, Bothner U. Effects of graded doses of vasopressin on median fibrillation frequency in a porcine model of cardiopulmonary resuscitation: results of a prospective, randomized, controlled trial. Crit Care Med 1996;24:1360–5.
89. Morris DC, Dereczyk BE, Grzybowski M, et al. Vasopressin can increase coronary perfusion pressure during human cardiopulmonary resuscitation. Acad Emerg Med 1997;4:878–83.
90. Lindner KH, Dirks B, Strohmenger HU, Prengel AW, Lindner IM, Lurie KG. Randomised comparison of epinephrine and vasopressin in patients with out-of-hospital ventricular fibrillation. Lancet 1997; 349:535–7.
91. Wenzel V, Linder KH, Augenstein S, Prengel AW, Strohmenger HU. Vasopressin combined with epinephrine decreases cerebral perfusion compared with vasopressin alone during cardiopulmonary resuscitation in pigs. Stroke 1998;29:1462–7.
92. Berg RA, Otto CW, Kern KB, et al. High-dose epinephrine results in greater early mortality after resuscitation from prolonged cardiac arrest in pigs: a prospective, randomized study. Crit Care Med 1994;22:282–90.
93. Brown CG, Martin DR, Pepe PE, et al., for the Multicenter High-Dose Epinephrine Study Group. A comparison of standard-dose and high-dose epinephrine in cardiac arrest outside the hospital. N Engl J Med 1992;327:1051–5.
94. Callaham M, Madsen CD, Barton CW, Saunders CE, Pointer J. A randomized clinical trial of high-dose epinephrine and norepinephrine vs. standard-dose epinephrine in prehospital cardiac arrest. JAMA 1992;268:2667–72.
95. Stiell IG, Hebert PC, Weitzman BN, et al. High-dose epinephrine in adult cardiac arrest. N Engl J Med 1992;327:1045–50.
96. Ralston SH, Babbs CF, Niebauer MJ. Cardiopulmonary resuscitation with interposed abdominal compression in dogs. Anesth Analg 1982;61:645–51.
97. Babbs CF, Ralston SH, Geddes LA. Theoretical advantages of abdominal counterpulsation in CPR as demonstrated in a simple electrical model of the circulation. Ann Emerg Med 1984;13:660–71.
98. Beyar R, Kishon Y, Sideman S, Dinnar U. Computer studies of systemic and regional blood flow mechanisms during cardiopulmonary resuscitation. Med Biol Eng Comput 1984;22:499–506.
99. Babbs CF, Sack JB, Kern KB. Interposed abdominal compression as an adjunct to cardiopulmonary resuscitation. Am Heart J 1994;127: 412–21.
100. Sack JB, Kesselbrenner MB, Bregman D. Survival from in-hospital cardiac arrest with interposed abdominal counterpulsation during cardiopulmonary resuscitation. JAMA 1992;267:379–85.
101. Ward KR, Sullivan RJ, Zelenak RR, Summer WR. A comparison of interposed abdominal compression CPR and standard CPR by monitoring end-tidal P_{CO_2}. Ann Emerg Med 1989;18:831–7.
102. Sack JB, Kesselbrenner MB, Jarrad A. Interposed abdominal compression–cardiopulmonary resuscitation and resuscitation outcome during asystole and electromechanical dissociation. Circulation 1992; 86:1692–1700.
103. Mateer JR, Stueven HA, Thompson BM, Aprahamian C, Darin JC. Prehospital IAC-CPR versus standard CPR: paramedic resuscitation of cardiac arrests. Am J Emerg Med 1985;3:143–6.
104. Sack JB, Kesselbrenner MB. Hemodynamics, survival benefits, and complications of interposed abdominal compression during cardiopulmonary resuscitation. Acad Emerg Med 1994;1:490–7.
105. Waldman PJ, Walters BL, Grunau CF. Pancreatic injury associated with interposed abdominal compressions in pediatric cardiopulmonary resuscitation. Am J Emerg Med 1984;2:510–2.
106. Babbs CF, Schoenlein WE, Lowe MW. Gastric insufflation during IAC-CPR and standard CPR in a canine model. Am J Emerg Med 1985;3:99–103.

107. Lindner KH, Pfenninger EG, Lurie KG, Schurmann W, Lindner IM, Ahnefeld FW. Effects of active compression–decompression resuscitation on myocardial and cerebral blood flow in pigs. Circulation 1993;88:1254–63.
108. Carli PA, De La Coussaye JE, Riou B, Sassine A, Eledjam JJ. Ventilatory effects of active compression–decompression in dogs. Ann Emerg Med 1994;24:890–4.
109. Cohen TJ, Tucker KJ, Lurie KG, et al., for the Cardiopulmonary Resuscitation Working Group. Active compression–decompression: a new method of cardiopulmonary resuscitation. JAMA 1992;267: 2916–23.
110. Wik L, Naess PA, Ilebekk A, Nicolaysen G, Steen PA. Effects of various degrees of compression and active decompression on haemodynamics, end-tidal CO_2, and ventilation during cardiopulmonary resuscitation of pigs. Resuscitation 1996;31:45–57.
111. Plaisance P, Lurie KG, Vicaut E, et al. A comparison of standard cardiopulmonary resuscitation and active compression-decompression resuscitation for out-of-hospital cardiac arrest. French Active Compression-Decompression Cardiopulmonary Resuscitation Group. N Engl J Med 1999;341:1893–9.
112. Stiell IG, Hebert PC, Wells GA, et al. The Ontario trial of active compression–decompression cardiopulmonary resuscitation for in-hospital and prehospital cardiac arrest. JAMA 1996;275:1417–23.
113. Schwab TM, Callaham ML, Madsen CD, Utecht TA. A randomized clinical trial of active compression–decompression CPR vs. standard CPR in out-of-hospital cardiac arrest in two cities. JAMA 1995;273:1261–8.
114. Mauer D, Schneider T, Dick W, Withelm A, Elich D, Mauer M. Active compression–decompression resuscitation: a prospective, randomized study in a two-tiered EMS system with physicians in the field. Resuscitation 1996;33:125–34.
115. Nolan J, Smith G, Evans R, et al. The United Kingdom prehospital study of active compression–decompression resuscitation. Resuscitation 1998;37:119–25.
116. Lurie KG, Coffeen P, Shultz J, McKnite S, Detloff B, Mulligan K. Improving active compression–decompression cardiopulmonary resuscitation with an inspiratory impedance valve. Circulation 1995;91: 1629–32.
117. Halperin HR, Tsitlik JE, Gelfand M, et al. A preliminary study of cardiopulmonary resuscitation by circumferential compression of the chest with use of a pneumatic vest. N Engl J Med 1993;329:762–8.
118. Beattie C, Guerci AD, Hall T, et al. Mechanisms of blood flow during pneumatic vest cardiopulmonary resuscitation. J Appl Physiol 1991;70:454–65.
119. Ben-Haim SA, Anuchnik CL, Dinnar U. A computer controller for vest cardiopulmonary resuscitation (CPR). IEEE Trans Biomed Eng 1988;35:413–6.
120. Criley JM, Niemann JT, Rosborough JP, Hausknecht M. Modifications of cardiopulmonary resuscitation based on the cough. Circulation 1986;74 Suppl IV:IV-42–50.
121. Guerci AD, Halperin HR, Beyar R, et al. Aortic diameter and pressure-flow sequence identify mechanism of blood flow during external chest compression in dogs. J Am Coll Cardiol 1989;14: 790–8.
122. Halperin HR, Guerci AD, Chandra N, et al. Vest inflation without simultaneous ventilation during cardiac arrest in dogs: improved survival from prolonged cardiopulmonary resuscitation. Circulation 1986;74:1407–15.
123. Halperin HR, Tsitlik JE, Beyar R, Chandra N, Guerci AD. Intrathoracic pressure fluctuations move blood during CPR: comparison of hemodynamic data with predictions from a mathematical model. Ann Biomed Eng 1987;15:385–403.
124. Halperin HR, Brower R, Weisfeldt ML, et al. Air trapping in the lungs during cardiopulmonary resuscitation in dogs: a mechanism for generating changes in intrathoracic pressure. Circ Res 1989;65:946–54.
125. Luce JM, Ross BK, O'Quin RJ, et al. Regional blood flow during cardiopulmonary resuscitation in dogs using simultaneous and non-simultaneous compression and ventilation. Circulation 1983;67:258–65.
126. Luce JM, Rizk NA, Niskanen RA. Regional blood flow during cardiopulmonary resuscitation in dogs. Crit Care Med 1984;12:874–78.
127. Niemann JT, Rosborough JP, Niskanen RA, Alferness C, Criley JM. Mechanical "cough" cardiopulmonary resuscitation during cardiac arrest in dogs. Am J Cardiol 1985;55:199–204.
128. Weston CF, de Latorre FJ, Dick WF, et al. VEST-CPR system: results of a multicenter randomized pilot study (abstr). J Am Coll Cardiol 1998;31 Suppl:403A.
129. Tang W, Weil MH, Schock RB, et al. Phased chest and abdominal compression–decompression: a new option for cardiopulmonary resuscitation. Circulation 1997;95:1335–40.
130. Wenzel V, Linder KH, Prengel HU, et al. Effect of phased chest and abdominal compression–decompression cardiopulmonary resuscitation on myocardial and cerebral blood flow in pigs. (abstr). Circulation 1997;96 Suppl I:1–60.
131. Sun S, Weil MHTW, Schock RB, Lucas J, Sato Y. Phased chest and abdominal compression–decompression produces sufficient minute ventilation during cardiopulmonary resuscitation (abstr). Chest 1996; 110:19S.
132. Sterz F, Behringer W, Berzlanovich A, et al. Active compression–decompression of thorax and abdomen (Lifestick TM-CPR) in patients with cardiac arrest (abstr). Circulation 1996;94:(I)I-9.
133. Sanders AB, Kern KB, Atlas M, Bragg S, Ewy GA. Importance of the duration of inadequate coronary perfusion pressure on resuscitation from cardiac arrest. J Am Coll Cardiol 1985;6:113–8.
134. Geehr EC, Lewis FR, Auerbach PS. Failure of open-heart massage to improve survival after prehospital nontraumatic cardiac arrest. N Engl J Med 1986;314:1189–90.
135. Takino M, Okada Y. The optimum timing of resuscitative thoracotomy for non-traumatic out-of-hospital cardiac arrest. Resuscitation 1993;26:69–74.
136. Boczar ME, Howard MA, Rivers EP, et al. A technique revisited: hemodynamic comparison of closed- and open-chest cardiac massage during human cardiopulmonary resuscitation. Crit Care Med 1995; 23:498–503.
137. Cantu RC, Ames A, Di Giacinto G, Dixon J. Hypotension: a major factor limiting recovery from cerebral ischemia. J Surg Res 1969;9: 525–9.
138. Kalimo H, Rehncrona S, Soderfeldt B, Olsson Y, Siesjo BK. Brain lactic acidosis and ischemic cell damage. 2. Histopathology. J Cereb Blood Flow Metab 1981;1:313–27.
139. Rehncrona S, Mela L, Siesjo BK. Recovery of brain mitochondrial function in the rat after complete and incomplete cerebral ischemia. Stroke 1979;10:437–46.
140. Chopp M, Welch KM, Tidwell CD, Helpern JA. Global cerebral ischemia and intracellular pH during hyperglycemia and hypoglycemia in cats. Stroke 1988;19:1383–7.
141. Ginsberg MD, Welsh FA, Budd WW. Deleterious effect of glucose pretreatment on recovery from diffuse cerebral ischemia in the cat. I. Local cerebral blood flow and glucose utilization. Stroke 1980;11: 347–54.
142. Pulsinelli WA, Waldman S, Rawlinson D, Plum F. Moderate hyperglycemia augments ischemic brain damage: a neuropathologic study in the rat. Neurology 1982;32:1239–46.
143. Grafton ST, Longstreth WTJ. Steroids after cardiac arrest: a retrospective study with concurrent, nonrandomized controls. Neurology 1988;38:1315–6.
144. Jastremski M, Sutton-Tyrrell K, Vaagenes P, Abramson N, Heiselman D, Safar P, for the Brain Resuscitation Clinical Trial I Study Group. Glucocorticoid treatment does not improve neurological recovery following cardiac arrest. JAMA 1989;262:3427–30.
145. Astrup J, Sorensen PM, Sorensen HR. Inhibition of cerebral oxygen and glucose consumption in the dog by hypothermia, pentobarbital, and lidocaine. Anesthesiology 1981;55:263–8.
146. Busto R, Dietrich WD, Globus MY, Valdes I, Scheinberg P, Ginsberg MD. Small differences in intraischemic brain temperature critically determine the extent of ischemic neuronal injury. J Cereb Blood Flow Metab 1987;7:729–38.
147. Busto R, Globus MY, Dietrich WD, Martinez E, Valdes I, Ginsberg MD. Effect of mild hypothermia on ischemia-induced release of neurotransmitters and free fatty acids in rat brain. Stroke 1989;20: 904–10.
148. Leonov Y, Sterz F, Safar P, et al. Mild cerebral hypothermia during and after cardiac arrest improves neurologic outcome in dogs. J Cereb Blood Flow Metab 1990;10:57–70.
149. Weinrauch V, Safar P, Tisherman S, Kuboyama K, Radovsky A.

Beneficial effect of mild hypothermia and detrimental effect of deep hypothermia after cardiac arrest in dogs. Stroke 1992;23:1454–62.
150. Brain Resuscitation Clinical Trial I Study Group. Randomized clinical study of thiopental loading in comatose survivors of cardiac arrest. N Engl J Med 1986;314:397–403.
151. Callaham M, Madsen CD. Relationship of timeliness of paramedic advanced life support interventions to outcome in out-of-hospital cardiac arrest treated by first responders with defibrillators. Ann Emerg Med 1996;27:638–48.
152. Gazmuri RJ, Weil MH, Bisera J, Tang W, Fukui M, McKee D. Myocardial dysfunction after successful resuscitation from cardiac arrest. Crit Care Med 1996;24:992–1000.
153. Kern KB, Hilwig RW, Rhee KH, Berg RA. Myocardial dysfunction after resuscitation from cardiac arrest: an example of global myocardial stunning. J Am Coll Cardiol 1996;28:232–40.
154. Tang W, Weil MH, Sun S, Gazmuri RJ, Bisera J. Progressive myocardial dysfunction after cardiac resuscitation. Crit Care Med 1993;21:1046–50.
155. Kern KB, Hilwig RW, Berg RA, et al. Postresuscitation left ventricular systolic and diastolic dysfunction: treatment with dobutamine. Circulation 1997;95:2610–3.
156. Tang W, Weil MH, Sun S. Katp-channel activation improves post-resuscitation myocardial function (abstr). Circulation 1997;96 Suppl I:I-366.
157. McGovern PG, Pankow JS, Shahar E, et al., for the Minnesota Heart Survey Investigators. Recent trends in acute coronary heart disease—mortality, morbidity, medical care, and risk factors. N Engl J Med 1996;334:884–90.
158. National Institutes of Health, NHLBI. Public Health Service of National Institutes of Health, editor. Morbidity and Mortality: 1998 Chartbook on Cardiovascular, Lung and Blood Diseases. Washington, DC, U.S. Department of Health and Human Services, 1998.
159. Gillum RF. Trends in acute myocardial infarction and coronary heart disease death in the United States. J Am Coll Cardiol 1994;23: 1273–7.
160. Goldberg RJ, Gorak EJ, Yarzebski J, et al. A communitywide perspective of sex differences and temporal trends in the incidence and survival rates after acute myocardial infarction and out-of-hospital deaths caused by coronary heart disease. Circulation 1993; 87:1947–53.
161. Pell S, Fayerweather WE. Trends in the incidence of myocardial infarction and in associated mortality and morbidity in a large employed population, 1957–1983. N Engl J Med 1985;312:1005–11.
162. Sytkowski PA, D'Agostino RB, Belanger A, Kannel WB. Sex and time trends in cardiovascular disease incidence and mortality: the Framingham Heart Study, 1950–1989. Am J Epidemiol 1996;143: 338–50.
163. Goldman L, Cook EF. The decline in ischemic heart disease mortality rates: an analysis of the comparative effects of medical interventions and changes in lifestyle. Ann Intern Med 1984;101: 825–36.
164. Stern MP. The recent decline in ischemic heart disease mortality. Ann Intern Med 1979;91:630–40.
165. Gruppo Italiano per lo Studio della Streptochinasi nell'Infarto Miocardico (GISSI). Effectiveness of intravenous thrombolytic treatment in acute myocardial infarction. Lancet 1986;1:397–402.
166. Grines CL, Browne KF, Marco J, et al., for the Primary Angioplasty in Myocardial Infarction Study Group. A comparison of immediate angioplasty with thrombolytic therapy for acute myocardial infarction. N Engl J Med 1993;328:673–9.
167. Lee KL, Woodlief LH, Topol EJ, et al., for the GUSTO-I Investigators. Predictors of 30-day mortality in the era of reperfusion for acute myocardial infarction: results from an international trial of 41,021 patients. Circulation 1995;91:1659–68.
168. Weaver WD, Cobb LA, Hallstrom AP, et al. Considerations for improving survival from out-of-hospital cardiac arrest. Ann Emerg Med 1986;15:1181–6.
169. Lipsey MW, Wilson DB. The efficacy of psychological, educational, and behavioral treatment: confirmation from a meta-analysis. Am Psychol 1993;48:1181–209.
170. Mullen PD, Mains DA, Velez R. A meta-analysis of controlled trials of cardiac patient education. Patient Educ Couns 1992;19:143–62.
171. Theis SL, Johnson JH, Strategies for teaching patents: a meta-analysis. Clin Nurse Spec 1995;9:100–5, 120.
172. Karlik BA, Yarcheski A, Braun J, Wu M. Learning needs of patients with angina: an extension study. J Cardiovasc Nurs 1990;4:70–82.
173. Kirsch IS. Adult Literacy in America: A First Look at the Results of the National Adult Literacy Survey. Diane Publishing Co., 1993:143.
174. Miller WR. Why do people change addictive behavior? The 1996 H. David Archibald Lecture. Addiction 1998;93:163–72.
175. Finnegan J, Meischke H, Zapka J, et al. Delay in seeking care for heart attack symptoms: findings from focus groups. Am J Prev Med 1999. In press.
176. Johnson JA, King KB. Influence of expectations about symptoms on delay in seeking treatment during a myocardial infarction. Am J Crit Care 1995;4:29–35.
177. Dracup K, Moser DK, Eisenberg M, Meischke H, Alonzo AA, Braslow A. Causes of delay in seeking treatment for heart attack symptoms. Soc Sci Med 1995;40:379–92.
178. Goldberg RJ, Gurwitz J, Yarzebski J, et al. Patient delay and receipt of thrombolytic therapy among patients with acute myocardial infarction from a community-wide perspective. Am J Cardiol 1992; 70:421–5.
179. Meischke H, Eisenberg MS, Larsen MP. Prehospital delay interval for patients who use emergency medical services: the effect of heart-related medical conditions and demographic variables. Ann Emerg Med 1993;22:1597–601.
180. Simons-Morton DG, Goff DC, Osganian S, et al., for the REACT Research Group. Rapid early action for coronary treatment: rationale, design, and baseline characteristics. Acad Emerg Med 1998;5:726–38.
181. Goff DC, Feldman HA, McGovern PG, et al. Prehospital delay in patients hospitalized with heart attack symptoms in the Unites States: the REACT trial. Am Heart J 1999;138:1046–57.
182. Cooper RS, Simmons B, Castaner A, et al. Survival rates and prehospital delay during myocardial infarction among black persons. Am J Cardiol 1986;57:208–11.
183. Gibler WB, Gore JM, Weaver WD, for the GUSTO-III Investigators. Reduced time to thrombolytic delivery, but static time to presentation: the GUSTO experience from 1990 to 1997 (abstr). Circulation 1997;96 Suppl I:I-201.
184. Ho MT, Eisenberg MS, Litwin PE, Schaeffer SM, Damon SK. Delay between onset of chest pain and seeking medical care: the effect of public education. Ann Emerg Med 1989;18:727–31.
185. Herlitz J, Hartford M, Karlson BV, et al. Effect of a media campaign to reduce delay times for acute myocardial infarction on the burden of chest pain patients in the emergency department. Cardiology 1991; 79:127–34.
186. Gaspoz JM, Unger PF, Urban P, et al. Impact of a public campaign on prehospital delay in patients reporting chest pain. Heart 1996;76: 150–5.
187. Meischke H, Dulberg EM, Schaeffer SS, Henwood DK, Larsen MP, Eisenberg MS. 'Call fast, call 911': a direct mail campaign to reduce patient delay in acute myocardial infarction. Am J Public Health 1997;87:1705–9.
188. National Heart Attack Alert Program (NHAAP) Coordinating Committee Access to Care Subcommittee. 9-1-1: Rapid identification and treatment of acute myocardial infarction. Bethesda (MD): U.S. Department of Health and Human Services, National Institutes of Health, 1994. NIH publication no. 94-3302.
189. National Heart Attack Alert Program Coordinating Committee Access to Care Subcommittee. 9-1-1: Rapid identification and treatment of acute myocardial infarction. Am J Emerg Med 1995; 13:188–95.
190. National Heart Attack Alert Program. Access to timely and optimal care of patients with acute coronary syndromes—community planning considerations. J Thromb Thrombol 1998;6:19–46.
191. Kuehl A, editor. EMS Medical Directors' Handbook/National Association of EMS Physicians. St. Louis: Mosby, 1989.
192. U.S. Congress Office of Technology Assessment. Rural Emergency Medical Services Special Report. Washington, DC: U.S. Government Printing Office, 1989. OTA-H-445.
193. Emergency Medical Services Dispatcher: National Standard Curriculum. Washington, DC: U.S. Department of Transportation National Highway Traffic Safety Administration, 1984. DOT HS 900 076.
194. National Heart Attack Alert Program Coordinating Committee Access to Care Subcommittee. Emergency medical dispatching: rapid

identification and treatment of acute myocardial infarction. Am J Emerg Med 1995;13:67–73.
195. Clawson JJ. Regulations and standards for emergency medical dispatchers: a model for state or region. Emerg Med Serv 1984;13:25–9.
196. Clawson JJ, Dernocoeur KB, editors. Principles of Emergency Medical Dispatch. Englewood Cliffs (NJ): Prentice-Hall, 1988.
197. National Heart Attack Alert Program (NHAAP) Coordinating Committee Access to Care Subcommittee. Emergency Medical Dispatching: Rapid Identification and Treatment of Acute Myocardial Infarction. Bethesda (MD): U.S. Department of Health and Human Services, 1994. NIH publication no. 94-3287.
198. Slovis CM, Carruth TB, Seitz WJ, Thomas CM, Elsea WR. A priority dispatch system for emergency medical services. Ann Emerg Med 1985;14:1055–60.
199. U.S. Department of Transportation, National Highway Transportation and Safety Administration. Emergency Medical Technician-Paramedic: National Standard Curriculum. Washington, DC: U.S. Department of Transportation, 1985. HS 900-089.
200. Roush WR, editor. Principles of EMS Systems. Dallas: American College of Emergency Physicians, 1989.
201. National Heart Attack Alert Program (NHAAP) Coordinating Committee Access to Care Subcommittee. National Institutes of Health, National Heart, Lung, and Blood Institute, editor. Staffing and Equipping Emergency Medical Services Systems: Rapid Identification and Treatment of Acute Myocardial Infarction. Bethesda (MD): U.S. Department of Health and Human Services, 1993. NIH publication no. 93-3304.
202. National Heart Attack Alert Program Coordinating Committee Access to Care Subcommittee. Staffing and equipping emergency medical services systems: rapid identification and treatment of acute myocardial infarction. Am J Emerg Med 1995;13:58–66.
203. Hauswald M, Yeoh E. Designing a prehospital system for a developing country: estimated cost and benefits. Am J Emerg Med 1997;15:600–3.
204. Kellermann AL, Hackman BB, Dobyns P, Frazier C, Nail L. Engineering excellence: options to enhance firefighter compliance with standing orders for first-responder defibrillation. Ann Emerg Med 1993;22:1269–75.
205. Richless LK, Schrading WA, Polana J, Hess DR, Ogden CS. Early defibrillation program: problems encountered in a rural/suburban EMS system. J Emerg Med 1993;11:127–34.
206. Roberts RR, Zalenski RJ, Mensah EK, et al. Costs of an emergency department–based accelerated diagnostic protocol vs. hospitalization in patients with chest pain: a randomized controlled trial. JAMA 1997;278:1670–6.
207. Selker HP, Zalenski RJ, Antman EM, et al. An evaluation of technologies for identifying acute cardiac ischemia in the emergency department: a report from a National Heart Attack Alert Program Working Group. Ann Emerg Med 1997;29:13–87.
208. Aufderheide TP, Hendley GE, Thakur RK, et al. The diagnostic impact of prehospital 12-lead electrocardiography. Ann Emerg Med 1990;19:1280–7.
209. Aufderheide TP, Keelan MH, Hendley GE, et al. Milwaukee Prehospital Chest Pain Project—phase I: feasibility and accuracy of prehospital thrombolytic candidate selection. Am J Cardiol 1992;69: 991–6.
210. Aufderheide TP, Hendley GE, Woo J, Lawrence S, Valley V, Teichman SL. A prospective evaluation of prehospital 12-lead ECG application in chest pain patients. J Electrocardiol 1992;24 Suppl:8–13.
211. Aufderheide TP, Haselow WC, Hendley GE, et al. Feasibility of prehospital r-tPA therapy in chest pain patients. Ann Emerg Med 1992;21:379–83.
212. Fine DG, Weiss AT, Sapoznikov D, et al. Importance of early initiation of intravenous streptokinase therapy for acute myocardial infarction. Am J Cardiol 1986;58:411–7.
213. Foster DB, Dufendach JH, Barkdoll CM, Mitchell BK. Prehospital recognition of AMI using independent nurse/paramedic 12-lead ECG evaluation: impact on in-hospital times to thrombolysis in a rural community hospital. Am J Emerg Med 1994;12:25–31.
214. Grim P, Feldman T, Martin M, Donovan R, Nevins V, Childers RW. Cellular telephone transmission of 12-lead electrocardiograms from ambulance to hospital. Am J Cardiol 1987;60:715–20.
215. Karagounis L, Ipsen SK, Jessop MR, et al. Impact of field-transmitted electrocardiography on time to in-hospital thrombolytic therapy in acute myocardial infarction. Am J Cardiol 1990;66:786–91.
216. Kereiakes DJ, Gibler WB, Martin LH, Pieper KS, Anderson LC. Relative importance of emergency medical system transport and the prehospital electrocardiogram on reducing hospital time delay to therapy for acute myocardial infarction: a preliminary report from the Cincinnati Heart Project. Am Heart J 1992;123:835–40.
217. Koren G, Weiss AT, Hasin Y, et al. Prevention of myocardial damage in acute myocardial ischemia by early treatment with intravenous streptokinase. N Engl J Med 1985;313:1384–9.
218. O'Rourke MF, Cook A, Carroll G, Gallagher D, Hall J. Accuracy of a portable interpretive ECG machine in diagnosis of acute evolving myocardial infarction. Aust N Z J Med 1992;22:9–13.
219. Weaver WD, Eisenberg MS, Martin JS, et al. Myocardial Infarction Triage and Intervention Project—phase I: patient characteristics and feasibility of prehospital initiation of thrombolytic therapy. J Am Coll Cardiol 1990;15:925–31.
220. Weaver WD, Cerqueira M, Hallstrom AP, et al. Prehospital-initiated vs. hospital-initiated thrombolytic therapy: the Myocardial Infarction Triage and Intervention trial. JAMA 1993;270:1211–6.
221. Canto JG, Rogers WJ, Bowlby LJ, French WJ, Pearce DJ, Weaver WD, for the National Registry of Myocardial Infarction-2 Investigators. The prehospital electrocardiogram in acute myocardial infarction: is its full potential being realized? J Am Coll Cardiol 1997;29: 498–505.
222. The European Myocardial Infarction Project Group. Prehospital thrombolytic therapy in patients with suspected acute myocardial infarction. N Engl J Med 1993;329:383–9.
223. Bippus PH, Storch WH, Andresen D, et al. Thrombolysis started at home in acute myocardial infarction: feasibility and time-gain (abstr). Circulation 1987;76 Suppl IV:IV-122.
224. Bossaert LL, Demey HE, Colemont LJ, et al. Prehospital thrombolytic treatment of acute myocardial infarction with anisoylated plasminogen streptokinase activator complex. Crit Care Med 1988;16: 823–30.
225. Castaigne AD, Herve C, Duval-Moulin AM, et al. Prehospital use of APSAC: results of a placebo-controlled study. Am J Cardiol 1989; 64:30A–33A.
226. Rawles J. Halving of mortality at 1 year by domiciliary thrombolysis in the Grampian Region Early Anistreplase Trial (GREAT). J Am Coll Cardiol 1994;23:1–5.
227. Risenfors M, Gustavsson G, Ekstrom L, et al. Prehospital thrombolysis in suspected acute myocardial infarction: results from the TEAHAT study. J Intern Med Suppl 1991;734:3–10.
228. Roth A, Barbash GI, Hod H, et al. Should thrombolytic therapy be administered in the mobile intensive care unit in patients with evolving myocardial infarction? A pilot study. J Am Coll Cardiol 1990;15:932–6.
229. Gibler WB, Kereiakes DJ, Dean EN, et al. Prehospital diagnosis and treatment of acute myocardial infarction: a north–south perspective—the Cincinnati Heart Project and the Nashville Prehospital tPA trial. Am Heart J 1991;121:1–11.
230. ACC/AHA Task Force on Practice Guidelines, Committee on Management of Acute Myocardial Infarction. ACC/AHA guidelines for the management of patients with acute myocardial infarction. J Am Coll Cardiol 1996;28:1328–428.
231. Kudenchuk PJ, Ho MT, Weaver WD, et al., for the MITI Project Investigators. Accuracy of computer-interpreted electrocardiography in selecting patients for thrombolytic therapy. Am Coll Cardiol 1991;17:1486–91.
232. Aufderheide TP, Kereiakes DJ, Weaver WD, Gibler WB, Simoons ML. Planning, implementation, and process monitoring for prehospital 12-lead ECG diagnostic programs. Prehosp Disaster Med 1996;11:162–71.
233. Selker HP, Zalenski RJ, Antman EM, et al. An evaluation of technologies for identifying acute cardiac ischemia in the emergency department: executive summary of a National Heart Attack Alert Program Working Group Report. Ann Emerg Med 1997;29:1–12.
234. Selker HP, Beshansky JR, Griffith JL, et al. Use of the acute cardiac ischemia time-insensitive predictive instrument (ACI-TIPI) to assist with triage of patients with chest pain or other symptoms suggestive of acute cardiac ischemia: a multicenter, controlled clinical trial. Ann Intern Med 1998;129:845–55.

235. Aufderheide TP, Rowlandson I, Lawrence SW, Kuhn EM, Selker HP. Test of the acute cardiac ischemia time-insensitive predictive instrument (ACI-TIPI) for prehospital use. Ann Emerg Med 1996; 27:193–8.
236. Rawles JM. Quantification of the benefit of earlier thrombolytic therapy: five-year results of the Grampian Region Early Anistreplase Trial (GREAT) (abstr). J Am Coll Cardiol 1997;30:1181–6.
237. The prehospital management of acute heart attacks: Recommendations of a Task Force of the European Society of Cardiology and the European Resuscitation Council. Eur Heart J 1998;19:1140–64.
238. Boersma E, Maas ACP, Deckers JW. Early thrombolytic treatment in acute myocardial infarction: reappraisal of the golden hour. Lancet 1996;348:771–5.
239. McClellan M, NcNeil BJ, Newhouse JP. Does more intensive treatment of myocardial infarction in the elderly reduce mortality? JAMA 1994;272:859–66.
240. Thiemann DR, Coresh J, Oetgen WJ, Powe NR. The association between hospital volume and survival after acute myocardial infarction in the elderly patient. N Engl J Med 1999;340:1640–8.
241. Chen J, Radford MJ, Wang Y, et al. Do America's best hospitals perform better for acute myocardial infarction? N Engl J Med 1999;340:286–92.
242. Fibrinolytic Therapy Trialists' (FTT) Collaborative Group. Indications for fibrinolytic therapy in suspected acute myocardial infarction: collaborative overview of early mortality and major morbidity results from all randomised trials of more than 1000 patients. Lancet 1994;343:311–22.
243. The GUSTO Investigators. An international randomized trial comparing four thrombolytic strategies for acute myocardial infarction. N Engl J Med 1993;329:673–82.
244. The GUSTO-3 Investigators. A comparison of reteplase with alteplase for acute myocardial infarction. N Engl J Med 1997;337:1118–23.
245. Menon V, Hochman DR, Holmes DR, et al. Lack of progress in cardiogenic shock: lessons from the GUSTO trials (abstr). J Am Coll Cardiol 1998;31 Suppl:136A.
246. Grines CL, Ellis SG, Jones M, et al. Primary angioplasty vs. thrombolytic therapy for acute myocardial infarction (MI): Long-term follow-up of ten randomized trials. Circulation 1999;100 Suppl I: I–499.
247. Hochman JS, Sleeper LA, Webb JG, et al. Early revascularization in acute myocardial infarction complicated by cardiogenic shock. N Engl J Med 1999;341:625–34.
248. Pozen MW, D'Agostino RB, Selker HP, Sytkowski PA, Hood WBJ. A predictive instrument to improve coronary-care-unit admission practices in acute ischemic heart disease: a prospective multicenter clinical trial. N Engl J Med 1984;310:1273–8.
249. Karlson BW, Herlitz J, Wiklund O, Richter A, Hjalmarson A. Early prediction of acute myocardial infarction from clinical history, examination and electrocardiogram in the emergency room. Am J Cardiol 1991;68:171–5.
250. McCarthy BD, Beshansky JR, D'Agostino RB, Selker HP. Missed diagnoses of acute myocardial infarction in the emergency department: results from a multicenter study. Ann Emerg Med 1993;22: 579–82.
251. Karcz A, Holbrook J, Burke MC, et al. Massachusetts emergency medicine closed malpractice claims: 1988–1990. Ann Emerg Med 1993;22:553–9.
252. Scanlon PJ, Faxon DP, Audet AM, et al. ACC/AHA guidelines for coronary angiography. J Am Coll Cardiol 1999;33:1756–824.
253. Gibler WB, Runyon JP, Levy RC, et al. A rapid diagnostic and treatment center for patients with chest pain in the emergency department. Ann Emerg Med 1995;25:1–8.
254. Lewis WR, Amsterdam E. Chest pain emergency units. Curr Opin Cardiol 1999;14:321–8.
255. Farkouh ME, Smars PA, Reeder GS, et al., for the Chest Pain Evaluation in the Emergency Room (CHEER) Investigators. A clinical trial of a chest-pain observation unit for patients with unstable angina. N Engl J Med 1998;339:1882–8.
256. Zalenski RJ, Rydman RJ, Ting S, Kampe L, Selker HP. A national survey of emergency department chest pain centers in the United States. Am J Cardiol 1998;81:1305–9.
257. Bahr RD. State-of-the-art in community coronary care. Md Med J 1983;32:516–20.
258. Bahr RD. Access to early cardiac care: chest pain as a risk factor for heart attacks, and the emergence of early cardiac care centers. Md Med J 1992;41:133–7.
259. Bahr RD. Reducing time to therapy in AMI patients: the new paradigm. Am J Emerg Med 1994;12:501–3.
260. Faden RR, Beauchamp TL, King NMP. A History and Theory of Informed Consent. New York: Oxford University Press, 1986.
261. Hoekstra JW, Gibler WB. Chest pain evaluation units: an idea whose time has come. JAMA 1997;278:1701–2.
262. Newby LK, Mark DB. The chest pain unit—ready for prime time? N Engl J Med 1998;339:1930–2.
263. Cannon CP, Johnson EB, Cermignani M, Scirica BM, Sagarin MJ, Walls RM. Emergency department thrombolysis critical pathway reduces door-to-drug times in acute myocardial infarction. Clin Cardiol 1999;22:17–20.
264. Braunwald E, Jones RH, Mark DB, et al. Diagnosing and managing unstable angina. Agency for Health Care Policy and Research. Circulation 1994;90:613–22.
265. National Heart Attack Alert Program Coordinating Committee, 60 Minutes to Treatment Working Group. Emergency department: rapid identification and treatment of patients with acute myocardial infarction. Ann Emerg Med 1994;23:311–29.
266. Ryan TJ, Anderson L, Antman E, et al. ACC/AHA guidelines for the management of patients with acute myocardial infarction: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (Committee on Management of Acute Myocardial Infarction). J Am Coll Cardiol 1996;28:1328–428.
267. Goldman L, Cook EF, Johnson PA, Brand DA, Rouan GW, Lee TH. Prediction of the need for intensive care in patients who come to the emergency departments with acute chest pain. N Engl J Med 1996;334:1498–504.
268. Carter C, Maddock R, Amsterdam E, McCormick S, Waters C, Billett J. Panic disorder and chest pain in the coronary care unit. Psychosomatics 1992;33:302–9.
269. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders, 4th ed. Washington, DC: American Psychiatric Association, 1994.
270. Cannon RO III. The sensitive heart: a syndrome of abnormal cardiac pain perception (clinical conference). JAMA 1995;273:883–7.
271. Bortone AS, Hess OM, Eberli FR, et al. Abnormal coronary vasomotion during exercise in patients with normal coronary arteries and reduced coronary flow reserve. Circulation 1989;79:516–27.
272. Ryan TJ, Antman EM, Brooks NH, et al. 1999 Update: ACC/AHA guidelines for the management of patients with acute myocardial infarction—a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (Committee on Management of Acute Myocardial Infarction). J Am Coll Cardiol 1999;34:890–911.
273. Matetzky S, Freimark D, Feinberg MS, et al. Acute myocardial infarction with isolated ST-segment elevation in posterior chest leads V_{7-9}: "hidden" ST-segment elevations revealing acute posterior infarction. J Am Coll Cardiol 1999;34:748–53.
274. Zimmerman J, Fromm R, Meyer D, et al. Diagnostic marker cooperative study for the diagnosis of myocardial infarction. Circulation 1999;99:1671–7.
275. Brogan GXJ, Friedman S, McCuskey C, et al. Evaluation of a new rapid quantitative immunoassay for serum myoglobin versus CK-MB for ruling out acute myocardial infarction in the emergency department. Ann Emerg Med 1994;24:665–71.
276. Antman EM, Tanasijevic MJ, Thompson B, et al. Cardiac-specific troponin I levels to predict the risk of mortality in patients with acute coronary syndromes. N Engl J Med 1996;335:1342–9.
277. Galvani M, Ottani F, Ferrini D, et al. Prognostic influence of elevated values of cardiac troponin I in patients with unstable angina. Circulation 1997;95:2053–9.
278. Hamm CW, Ravkilde J, Gerhardt W, et al. The prognostic value of serum troponin T in unstable angina. N Engl J Med 1992;327:146–50.
279. Ohman EM, Armstrong PW, Christenson RH, et al., for the GUSTO IIA Investigators. Cardiac troponin T levels for risk stratification in acute myocardial ischemia. N Engl J Med 1996;335: 1333–41.
280. Hamm CW, Heeschen C, Goldmann B, et al., for the c7E3 Fab

Antiplatelet Therapy in Unstable Refractory Angina (CAPTURE) Study Investigators. Benefit of abciximab in patients with refractory unstable angina in relation to serum troponin T levels. N Engl J Med 1999;340:1623–9.
281. Adams JE, Abendschein DR, Jaffe AS. Biochemical markers of myocardial injury: is MB creatine kinase the choice for the 1990s? Circulation 1993;88:750–63.
282. Apple FS, Falahati A, Paulsen PR, Miller EA, Sharkey SW. Improved detection of minor ischemic myocardial injury with measurement of serum cardiac troponin I. Clin Chem 1997;43:2047–51.
283. Jaffe AS, Landt Y, Parvin CA, Abendschein DR, Geltman EM, Ladenson JH. Comparative sensitivity of cardiac troponin I and lactate dehydrogenase isoenzymes for diagnosing acute myocardial infarction. Clin Chem 1996;42:1770–6.
284. Hamm CW, Goldmann BU, Heeschen C, Kreymann G, Berger J, Meinertz T. Emergency room triage of patients with acute chest pain by means of rapid testing for cardiac troponin T or troponin I. N Engl J Med 1997;337:1648–53.
285. Newby LK, Kaplan AL, Granger BB, Sedor F, Califf RM, Ohman EM. Comparison of cardiac troponin T versus creatine kinase-MB for risk stratification in a chest pain unit. Am J Cardiol 2000. In Press.
286. Jaffe AS. More rapid biochemical diagnosis of myocardial infarction: necessary? prudent? cost effective? Clin Chem 1993;39:1567–9.
287. Wu AH, Apple FS, Gibler WB, Jesse RL, Warshaw MM, Valdes RJ. National Academy of Clinical Biochemistry Standards of Laboratory Practice: recommendations for the use of cardiac markers in coronary artery diseases. Clin Chem 1999;45:1104–21.
288. Pearson SD, Goldman L, Orav EJ, et al. Triage decisions for emergency department patients with chest pain: do physicians' risk attitudes make the difference? J Gen Intern Med 1995;10:557–64.
289. Goldman L, Cook EF, Brand DA, et al. A computer protocol to predict myocardial infarction in emergency department patients with chest pain. N Engl J Med 1988;318:797–803.
290. Selker HP, Griffith JL, D'Agostino RB. A tool for judging coronary care unit admission appropriateness, valid for both real-time and retrospective use: a time-insensitive predictive instrument (TIPI) for acute cardiac ischemia: a multicenter study. Med Care 1991;29:610–27 (published erratum in Med Care 1992;30:188).
291. Reilly B, Durairaj L, Husain S, et al. Performance and potential impact of a chest pain prediction rule in a large public hospital. Am J Med 1999;106:285–91.
292. Corey GA, Merenstein JH. Applying the acute ischemic heart disease predictive instrument. J Fam Pract 1987;25:127–33.
293. Lee TH, Pearson SD, Johnson PA, et al. Failure of information as an intervention to modify clinical management: a time-series trial in patients with acute chest pain. Ann Intern Med 1995;122:434–7.
294. Pearson SD, Goldman L, Garcia TB, Cook EF, Lee TH. Physician response to a prediction rule for the triage of emergency department patients with chest pain. J Gen Intern Med 1994;9:241–7.
295. Lee TH, Rouan GW, Weisberg MC, et al. Clinical characteristics and natural history of patients with acute myocardial infarction sent home from the emergency room. Am J Cardiol 1987;60:219–24.
296. Rusnak RA, Stair TO, Hansen K, Fastow JS. Litigation against the emergency physician: common features in cases of missed myocardial infarction. Ann Emerg Med 1989;18:1029–34.
297. Nichol G, Walls R, Goldman L, et al. A critical pathway for management of patients with acute chest pain who are at low risk for myocardial ischemia: recommendations and potential impact. Ann Intern Med 1997;127:996–1005.
298. American College of Emergency Physicians. Clinical policy for the initial approach to adults presenting with a chief complaint of chest pain, with no history of trauma. Ann Emerg Med 1995;25:274–99.
299. Gunnar RM, Passamani ER, Bourdillon PD, et al. Guidelines for the early management of patients with acute myocardial infarction—a report of the American College of Cardiology/American Heart Association Task Force on Assessment of Diagnostic and Therapeutic Cardiovascular Procedures (Subcommittee to Develop Guidelines for the Early Management of Patients with Acute Myocardial Infarction). J Am Coll Cardiol 1990;16:249–92.
300. Lee TH, Rouan GW, Weisberg MC, et al. Sensitivity of routine clinical criteria for diagnosing myocardial infarction within 24 hours of hospitalization. Ann Intern Med 1987;106:181–6.
301. Lee TH, Juarez G, Cook EF, et al. Ruling out acute myocardial infarction: a prospective multicenter validation of a 12-hour strategy for patients at low risk. N Engl J Med 1991;324:1239–46.
302. Weingarten SR, Riedinger MS, Conner L, et al. Practice guidelines and reminders to reduce duration of hospital stay for patients with chest pain: an interventional trial. Ann Intern Med 1994;120:257–63.
303. Pearson SD, Goulart-Fisher D, Lee TH. Critical pathways as a strategy for improving care: problems and potential. Ann Intern Med 1995;123:941–8.
304. Kirk JD, Turnipseed S, Lewis WR, Amsterdam EA. Evaluation of chest pain in low-risk patients presenting to the emergency department: the role of immediate exercise testing. Ann Emerg Med 1998;32:1–7.
305. Lewis WR, Amsterdam EA, Turnipseed S, Kirk JD. Immediate exercise testing of low risk patients with known coronary artery disease presenting to the emergency department with chest pain. J Am Coll Cardiol 1999;33:1843–7.
306. Amsterdam E, Kirk JD, Turnipseed S, Lewis WR, Yadiapalli S. Immediate exercise testing for assessment of clinical risk in patients presenting to the emergency department with chest pain: results in over 1,000 patients (abstr). Circulation 998;98 Suppl I:I-774.
307. Hauser AM, Gangadharan V, Ramos RG, Gordon S, Timmis GC. Sequence of mechanical, electrocardiographic and clinical effects of repeated coronary artery occlusion in human beings: echocardiographic observations during coronary angioplasty. J Am Coll Cardiol 1985;5:193–7.
308. Pandian NG, Skorton DJ, Collins SM, et al. Myocardial infarct size threshold for two-dimensional echocardiographic detection: sensitivity of systolic wall thickening and endocardial motion abnormalities in small versus large infarcts. Am J Cardiol 1985;55:551–5.
309. Sabia P, Afrookteh A, Touchstone DA, Keller MW, Esquivel L, Kaul S. Value of regional wall motion abnormality in the emergency room diagnosis of acute myocardial infarction: a prospective study using two-dimensional echocardiography. Circulation 1991;84 Suppl I:I-85–92.
310. Gardner CJ, Brown S, Hagen-Ansert S, et al. Guidelines for cardiac sonographer education: report of the American Society of Echocardiography Sonographer Education and Training Committee. J Am Soc Echocardiogr 1992;5:635–9.
311. Pearlman AS, Gardin JM, Martin RP, et al. Guidelines for optimal physician training in echocardiography: recommendations of the American Society of Echocardiography Committee for Physician Training in Echocardiography. Am J Cardiol 1987;60:158–63.
312. Trippi JA, Lee KS, Kopp G, Nelson D, Kovacs R. Emergency echocardiography telemedicine: an efficient method to provide 24-hour consultative echocardiography. J Am Coll Cardiol 1996;27:1748–52.
313. Levitt MA, Promes SB, Bullock S, et al. Combined cardiac marker approach with adjunct two-dimensional echocardiography to diagnose acute myocardial infarction in the emergency department. Ann Emerg Med 1996;27:1–7.
314. Kontos MC, Arrowood JA, Paulsen WH, Nixon JV. Early echocardiography can predict cardiac events in emergency department patients with chest pain. Ann Emerg Med 1998;31:550–7.
315. Fleischmann KE, Lee TH, Come PC, et al. Echocardiographic prediction of complications in patients with chest pain. Am J Cardiol 1997;79:292–8.
316. Ritchie JL, Cheitlin MD, Eagle KA, et al. ACC/AHA guidelines for the clinical application of echocardiography. J Am Coll Cardiol 1997;29:862–79.
317. Ritchie JL, Gibbons RJ, Cheitlin MD, et al. ACC/AHA guidelines for exercise testing. Circulation 1997;96:345–54.
318. Wackers FJ, Sokole EB, Samson G, et al. Value and limitations of thallium-201 scintigraphy in the acute phase of myocardial infarction. N Engl J Med 1976;295:1–5.
319. Wackers FJ, Lie KI, Liem KL, et al. Thallium-201 scintigraphy in unstable angina pectoris. Circulation 1978;57:738–42.
320. Wackers FJ, Lie KI, Liem KL, et al. Potential value of thallium-201 scintigraphy as a means of selecting patients for the coronary care unit. Br Heart J 1979;41:111–7.
321. Varetto T, Cantalupi D, Altieri A, Orlandi C. Emergency room technetium-99m sestamibi imaging to rule out acute myocardial ischemic events in patients with nondiagnostic electrocardiograms. J Am Coll Cardiol 1993;22:1804–8.

322. Tatum JL, Jesse RL, Kontos MC, et al. Comprehensive strategy for the evaluation and triage of the chest pain patient. Ann Emerg Med 1997;29:116–25.
323. Kontos MC, Jesse RL, Schmidt KL, Ornato JP, Tatum JL. Value of acute rest sestamibi perfusion imaging for evaluation of patients admitted to the emergency department with chest pain. J Am Coll Cardiol 1997;30:976–82.
324. Hilton TC, Thompson RC, Williams HJ, Saylors R, Fulmer H, Stowers SA. Technetium-99m sestamibi myocardial perfusion imaging in the emergency room evaluation of chest pain. J Am Coll Cardiol 1994;23:1016–22.
325. Heller GV, Stowers SA, Hendel RC, et al. Clinical value of acute rest technetium-99m tetrofosmin tomographic myocardial perfusion imaging in patients with acute chest pain and nondiagnostic electrocardiograms. J Am Coll Cardiol 1998;31:1011–7.
326. Bilodeau L, Theroux P, Gregoire J, Gagnon D, Arsenault A. Technetium-99m sestamibi tomography in patients with spontaneous chest pain: correlations with clinical, electrocardiographic and angiographic findings. J Am Coll Cardiol 1991;18:1684–91.
327. DePuey EG, Rozanski A. Using gated technetium-99m–sestamibi SPECT to characterize fixed myocardial defects as infarct or artifact. J Nucl Med 1995;36:952–5.
328. Bromley JT, Amsterdam E, Lewis WR, et al. Characterization of patients with repeat emergency department visits for chest pain and negative cardiac findings (abstr). Circulation 1999;100 Suppl 1:I-444.
329. U.S. Government. Basic DHHS Policy for Protection of Human Research Subjects, vol. 1, parts 1 to 99. 1998.
330. Advisory Committee on Human Radiation Experiments. Research ethics and the medical profession. JAMA 1996;276:403–9.
331. Trials of war criminals before the Nuernberg military tribunals under Control Council law 10, Vol. 2 (Washington, DC: US Govt. Printing Office, 1949), pg. 181 & 182.
332. Katz J. The Nuernberg Code and the Nuernberg Trial: a reappraisal. JAMA 1996;276:1662–6.
333. Final Report of the Tuskegee Syphilis Study Ad Hoc Advisory Panel. U.S. Public Health Service, 1973.
334. Rickham PP. Human experimentation: code of ethics of the World Medical Association. Declaration of Helsinki. BMJ 1964;5402:177–80.
335. The National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research. Department of Health. The Belmont Report: ethical principles and guidelines for the protection of human subjects of research. Washington, DC: Office of the Secretary, 1979. OPRR publication no. 887-806.
336. Biros MH, Lewis RJ, Olson CM, Runge JW, Cummins RO, Fost N. Informed consent in emergency research: consensus statement from the Coalition Conference of Acute Resuscitation and Critical Care Researchers. JAMA 1995;273:1283–7.
337. U.S. Government, Food and Drug Administration. Title 21 CFR 50.24. Exception from informed consent requirements for emergency research (61 FR 51528), Oct. 2, 1996.
338. Nightingale SL. From the Food and Drug Administration. JAMA 1997;278:379.
339. Fost N. Waived consent for emergency research. Am J Law Med 1998;24:163–83.
340. Santora TA, Cowell V, Trooskin SZ. Working through the public disclosure process mandated by use of 21 CFR 50.24 (exception to informed consent): guidelines for success. J Trauma 1998;45:907–13.
341. Wichman A. Ethics of proxy consent for research involving patients with adult respiratory distress syndrome. JAMA 1996;276:949–50.
342. Kremers MS, Whisnant DR, Lowder LS, Gregg L. Initial experience using the Food and Drug Administration guidelines for emergency research without consent. Ann Emerg Med 1999;33:224–9.
343. Smithline HA, Gerstle ML. Waiver of informed consent: a survey of emergency medicine patients. Am J Emerg Med 1998;16:90–1.
344. Streptomycin in Tuberculosis Trials Committee, Medical Research Council. Streptomycin in pulmonary tuberculosis. BMJ 1998;317:1248.
345. Friedman LM, Furberg CD, DeMets DL. Fundamentals of Clinical Trials. Boston: Wright-PSG, 1981.
346. Hellman S, Hellman DS. Of mice but not men: problems of the randomized clinical trial. N Engl J Med 1991;324:1585–9.
347. Passamani E. Clinical trials—are they ethical? N Engl J Med 1991;324:1589–92.
348. Freedman B. Equipoise and the ethics of clinical research. N Engl J Med 1987;317:141–5.
349. Beauchamp TL, Childress JF. Principles of Biomedical Ethics. Appendix II, The Nuremberg Code edition. New York: Oxford University Press, 1979:287.
350. Beauchamp TL, Childress JF. Principles of Biomedical Ethics. Appendix II, The World Health Association Declaration of Helsinki edition. New York: Oxford University Press, 1979:289.
351. American Medical Association. Waiver of Informed Consent for Research in Emergency Situations. 1999, Opinion 8.085, AMA Code of Medical Ethics.
352. Recombinant DNA Research: Actions Under the Guidelines. 1997, pp. 59031–59046. Federal Register: vol. 62, no. 211. Notice of Actions Under the NIH Guidelines for Research Involving Recombinant DNA Molecules (NIH Guidelines) (59 FR 34496, amended 59 FR 40170, 60 FR 20726, 61 FR 10004, 62 FR 4782).